

CLAIMS

1. An 3- $\alpha$ -glycosyl  $\alpha,\alpha$ -trehalose which has an  $\alpha$ -glucosyl  
5  $\alpha,\alpha$ -trehalose structure, represented by the chemical formula 1,  
intermolecularly.

Chemical formula 1:

$O-\alpha-D-Glcp-(1\rightarrow 3)-O-\alpha-D-Glcp-(1\rightarrow 1)-\alpha-D-Glcp$

2. The 3- $\alpha$ -glycosyl  $\alpha,\alpha$ -trehalose of claim 1, wherein said  
3- $\alpha$ -glycosyl  $\alpha,\alpha$ -trehalose is 3-isomaltosyl  $\alpha,\alpha$ -trehalose represented  
10 by the chemical formula 2.

Chemical formula 2:

$O-\alpha-D-Glcp-(1\rightarrow 6)-O-\alpha-D-Glcp-(1\rightarrow 3)-O-\alpha-D-Glcp-(1\rightarrow 1)-\alpha-D-Glcp$

3. The 3- $\alpha$ -glycosyl  $\alpha,\alpha$ -trehalose of claim 1, wherein said  
3- $\alpha$ -glycosyl  $\alpha,\alpha$ -trehalose is 3- $\alpha$ -glucosyl  $\alpha,\alpha$ -trehalose represented  
15 by the chemical formula 3.

Chemical formula 3:

$O-\alpha-D-Glcp-(1\rightarrow 3)-O-\alpha-D-Glcp-(1\rightarrow 1)-\alpha-D-Glcp$

4. A method for forming 3- $\alpha$ -glycosyl  $\alpha,\alpha$ -trehalose of any  
one of claims 1 to 3, which comprises a step of allowing  
20  $\alpha$ -isomaltosyl-transferring enzyme to act on an aqueous solution  
comprising  $\alpha,\alpha$ -trehalose and a saccharide having a glucose  
polymerization degree of 3 or higher and bearing both the  $\alpha$ -1,6 glucosidic  
linkage as a linkage at the non-reducing end and the  $\alpha$ -1,4 glucosidic  
linkage other than the linkage at the non-reducing end.

25 5. The method of claim 4, wherein said saccharide is prepared  
by allowing  $\alpha$ -isomaltosylglucosaccharide-forming enzyme to act on

partial starch hydrolyzates.

6. The method of claim 4 or 5, which further comprises a step of allowing glucoamylase to act on the reaction mixture.

7. A method of forming  $\alpha$ -glycosyl  $\alpha,\alpha$ -trehalose, which 5 comprises the step of allowing a saccharide-transferring enzyme to act on an aqueous solution comprising 3- $\alpha$ -isomaltosyl  $\alpha,\alpha$ -trehalose represented by the chemical formula 2 and/or 3- $\alpha$ -glucosyl  $\alpha,\alpha$ -trehalose represented by the chemical formula 3 and optional other saccharides to form said  $\alpha$ -glycosyl  $\alpha,\alpha$ -trehalose of claim 1.

10 8. A process for producing 3- $\alpha$ -glycosyl  $\alpha,\alpha$ -trehalose of claim 2, which comprises the steps of:

allowing  $\alpha$ -isomaltosyl-transferring enzyme to act on an aqueous solution comprising  $\alpha,\alpha$ -trehalose and a saccharide having a glucose polymerization degree of 3 or higher and bearing both the  $\alpha$ -1,6 15 glucosidic linkage as a linkage at the non-reducing end and the  $\alpha$ -1,4 glucosidic linkage other than the linkage at the non-reducing end to form 3- $\alpha$ -isomaltosyl  $\alpha,\alpha$ -trehalose represented by the chemical formula 2; and

collecting the resulting 3- $\alpha$ -isomaltosyl  $\alpha,\alpha$ -trehalose.

20 9. The process of claim 8, wherein said saccharide is prepared by allowing  $\alpha$ -isomaltosylglucosaccharide-forming enzyme to act on starchy substances.

10. A process for producing 3- $\alpha$ -glycosyl  $\alpha,\alpha$ -trehalose of claim 3, which comprises the steps of:

25 allowing  $\alpha$ -isomaltosyl-transferring enzyme to act on an aqueous solution comprising  $\alpha,\alpha$ -trehalose and a saccharide having a

glucose polymerization degree of 3 or higher and bearing both the  $\alpha$ -1,6 glucosidic linkage as a linkage at the non-reducing end and the  $\alpha$ -1,4 glucosidic linkage other than the linkage at the non-reducing end to form 3- $\alpha$ -isomaltosyl  $\alpha,\alpha$ -trehalose represented by the chemical formula

5 2;

successively allowing glucoamylase to act on the resulting 3- $\alpha$ -isomaltosyl  $\alpha,\alpha$ -trehalose to form 3- $\alpha$ -glucosyl  $\alpha,\alpha$ -trehalose represented by the chemical formula 3; and

collecting the resulting 3- $\alpha$ -glucosyl  $\alpha,\alpha$ -trehalose.

10 11. A process for producing  $\alpha$ -glycosyl  $\alpha,\alpha$ -trehalose, which comprises the step of:

allowing a saccharide-transferring enzyme to act on an aqueous solution comprising 3- $\alpha$ -isomaltosyl  $\alpha,\alpha$ -trehalose represented by the chemical formula 2 and/or 3- $\alpha$ -glucosyl  $\alpha,\alpha$ -trehalose represented by the chemical formula 3 and optional other saccharides to form  $\alpha$ -glycosyl  $\alpha,\alpha$ -trehalose of claim 1; and

collecting the resulting  $\alpha$ -glycosyl  $\alpha,\alpha$ -trehalose.

12. The process for producing  $\alpha$ -glycosyl  $\alpha,\alpha$ -trehalose of any one of claims 8 to 11, wherein said  $\alpha$ -glycosyl  $\alpha,\alpha$ -trehalose is collected by a column chromatography using a column packed with a salt-type strongly acidic cation exchange resin.

13. A composition which comprises  $\alpha$ -glycosyl  $\alpha,\alpha$ -trehalose of any one of claims 1 to 3.

14. The composition of claim 13, where one or more ingredients selected from the group consisting of other non-reducing saccharides, reducing saccharides, sugar alcohols, and minerals are incorporated

into said  $\alpha$ -glycosyl  $\alpha,\alpha$ -trehalose of any one of claims 1 to 3.

15. The composition of claim 13 or 14, which is in the form of a product for oral use, food and beverage, cosmetic, or pharmaceutical.